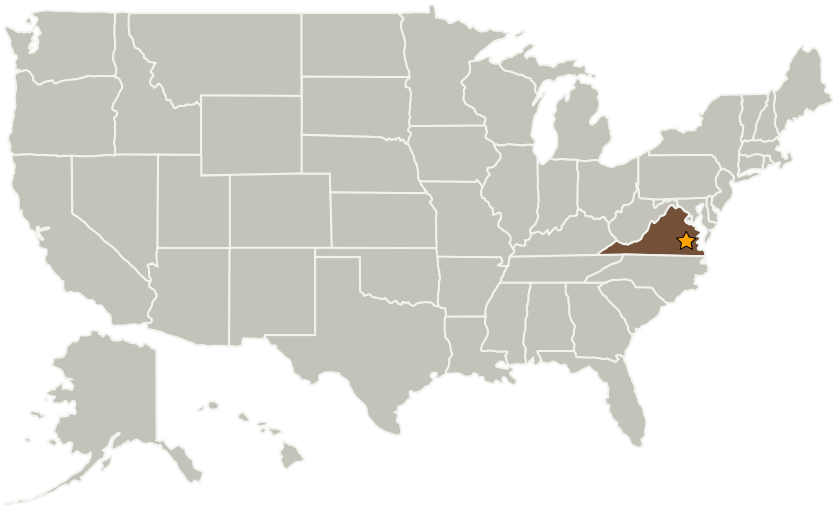
High Spatial Resolution shape Sensing for Adaptive Aerospace Vehicles, Phase I

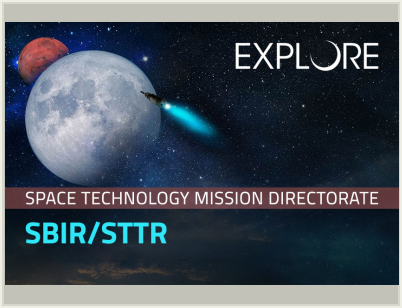
Completed Technology Project (2004 - 2004)

Project Introduction

It is accepted that adaptive aerospace vehicles whose flight avionic systems are reconfigurable are needed to respond to changing flight parameters, vehicle system performance degradation, or external threat environments. To this end shape modification of aerospace structures during flight can provide significant performance improvements derived from matching the aerodynamic shape to particular flight conditions. To address this need, new sensor technologies are required for both R & D testing and operational deployment that permit high observability into the shapes generated. Luna Innovations proposes to develop high-spatial resolution distributed fiber-optic shape sensors to provide feedback as part of a closed-loop control system for vehicles with yadaptivey attributes (i.e. y ysmarty wings, etc.). These shape sensors, when embedded in aircraft wings or other structures of interest, will monitor the dynamic shape of the structure independent of the temperature or load environment, thus enabling real-time active control of reconfigurable avionics. By providing a reliable, low cost, lightweight feedback mechanism, the risks associated with employing smart vehicle technology are substantially mitigated.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Luna Innovations, Inc.	Supporting Organization	Industry	Roanoke, Virginia

Primary U.S. Work Locations
Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Roger Duncan

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.3 Aeroelasticity